RECEIVING • INSTALLATION • MAINTENANCE

INSTRUCTIONS

GAS-OIL SEAL EXPANSION TANK

THE GAS-OIL SEAL EXPANSION TANK is a vertical steel tank with a horizontal portion dividing the tank in almost two equal sections. It is usually mounted on the side of the transformer tank as shown in Fig. 1 but may be integral with the transformer tank. The lower section is almost completely filled with oil with the gas space over the oil connected to the gas space of the transformer by means of a small pipe.

A pipe connection from the bottom of the lower section to the bottom of the upper section permits oil to flow from the bottom section to the upper section whenever the pressure of the gas space increases and to flow from the upper section to the lower section when the pressure in the gas space decreases.

A dehydrating breather is usually connected to the top of the upper section to prevent the entrance of moisture into the upper section due to the normal breathing of the transformer.

The dehydrating breather consists of a rectangular steel container with a glass observation window and a connection pipe located near the top, a breather plug at the side of the case with a drain plug and another observation window near the bottom.

A valve is placed in the gas line between the expansion tank and the transformer tank to permit filling the main transformer tank under vacuum. A drain valve is provided in the bottom section of the expansion tank for draining oil from the expansion tank.

A sampling valve and a pressure gauge is connected to the gas space of the lower section. The sampling valve may be used to obtain samples of gas from the gas space and is also used in blowing out the transformer gas space. The pressure gauge may be used to check the operation of the equipment.

The size of the expansion tank required is determined by the volume of oil in the transformer, the size of the gas space and the range of operating temperatures. The normal range of temperatures variation provided is from −20°C to the maximum full load rise above a 40°C ambient.

When properly installed and with gas tight transformer, the Gas-Oil Seal expansion tank will maintain positive pressure in the transformer gas space for all normal operating conditions. The expansion tank also reduces the rate of oxidation of the transformer oil because of the slow transfer of oxygen from the air through the cold oil of the expansion tank and into the gas space.

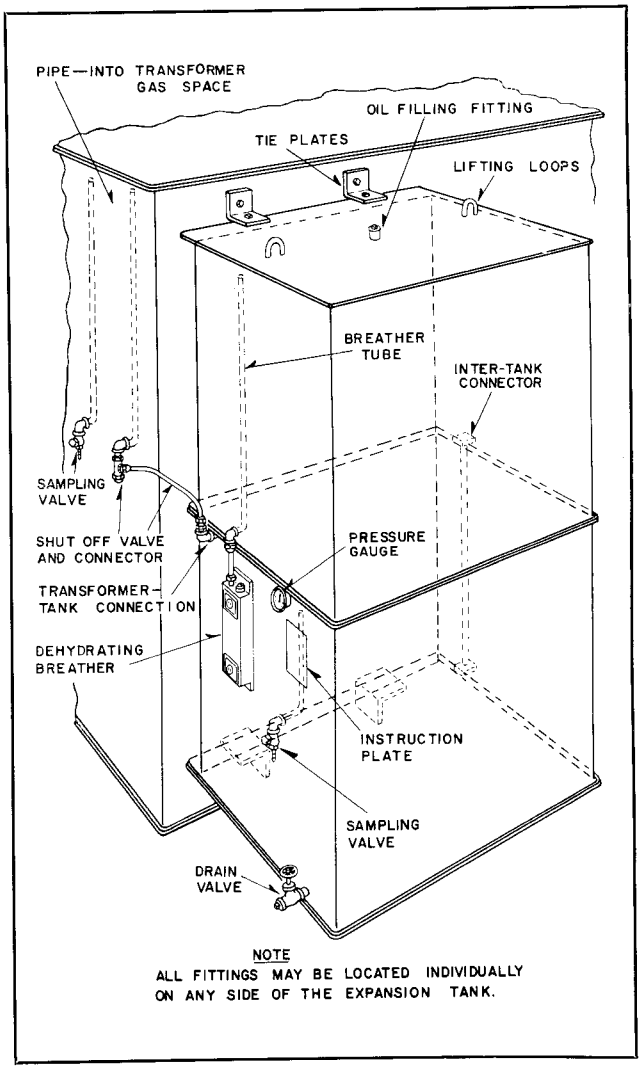

FIG. 1. Typical Installation of Gas-Oil Seal Expansion Tank

RECEIVING

When clearance permit, the expansion tank is shipped completely installed on the transformer tank and with the dehydrating material in the breather. If clearances prevent such shipment, the expansion tank is dismantled and shipped as a unit along with the other apparatus. In this case the dehydrating material is removed from the breather and placed in a separate container.

INSTALLATION

Bolt the expansion tank onto its mounting brackets and connect it to the transformer tank through the piping supplied. Open the sampling valve and fill expansion tank with oil through the hand hole or filling connections on top of the upper section. When almost full, fill slowly to prevent accumulation of oil in upper section. Fill until oil flows out of the sampling valve. Do not close sampling valve until all oil in the upper section has been transferred to the lower section.

After the transformer tank has been filled with oil, open the valve between transformer tank and expansion tank.

If it is desired to purge the air from the gas space of the transformer, open the sampling valve on the expansion tank and blow dry nitrogen into gas space of the transformer until the gas coming from the sampling valve on the expansion tank is comparatively free of oxygen. Close sampling valve and allow the pressure to rise until all the oil in the lower section of the expansion tank has been transferred to the upper section. Stop the flow of nitrogen into the transformer tank and seal off this transformer tank connection. Expansion of oil in the transformer during the first load cycle will cause the excess gas to bubble out through the upper section.

To mount the breather when shipped disassembled: Bolt the dehydrating chamber to the pads provided on the expansion tank wall.

Connect the pipe between top of the breather and top of expansion tank. The screw joints in the pipe connection must be air tight.

Remove the 1 inch pipe plug in top of the dehydrating chamber and fill chamber with dry dehydrating material.

NOTE: Use a high temperature grease on the screw joints to prevent rust and permit the parts to be readily removed when necessary.

OPERATION

It is recommended that periodic readings be taken of the pressure during the life of the equipment to determine if any leaks have occurred in the transformer or expansion tank since last inspection. The readings should be taken more frequently when first placed in operation and after the transformer or expansion tank have been opened for inspection or servicing.

If a dehydrating breather with cobalt chloride impregnated silica gel is supplied, the color of the silica gel should be watched to determine when it should be replaced or reactivated. Cobalt chloride impregnated silica gel is deep blue in color when dry. As it absorbs water the color changes from deep blue to whitish pink, the color working up from the bottom.

MAINTENANCE

The Gas-Oil Seal expansion tank will require little maintenance except periodic painting, checking for leaks and replacing dehydrating material when necessary. A check for leaks should be made if the pressure is lower than normal.

Since hot oil will absorb a considerable amount of gas, a low pressure may result unless the absorbed gas is replaced by additional gas blown into the transformer. Therefore a loss of pressure during the first days of operation does not necessarily indicate a leak, but may be due to the absorption of gas into the oil. After the gas absorption and replacement has been completed, a loss of pressure at any fixed temperature indicates gas or oil leakage.

Under normal operating conditions, with standard design, and with absorbed gas replaced, the pressure as indicated by the pressure gauge should not be less than that obtained from the equation $P = .00064\ H\ (20 + T_X)$ where H equals height of lower section in inches and T_X is the transformer top oil temperature in degrees centigrade as indicated on the transformer thermometer.

The quantity of dehydrating material in the breather is sufficient to last from six months to a year before drying is necessary. This time depends upon the size of the transformer, the load cycle of the transformer and the atmospheric conditions. It is advisable that the color behind the lower window be checked frequently at first to determine the approximate length of time that the breather will operate on the particular transformer.

When the whitish pink color begins to appear in the lower part of the top observation window, it is an indication that the dehydrating material should be changed or dried out in the near future.

A recommended method is to have a second charge of dry dehydrating material kept on hand in a sealed container. Then it is only necessary to remove the damp material and replace it with dry

material. The damp material removed can be dried out and stored for the next change.

To replace the charge, remove the 3/4" bronze pipe plug at the bottom of the housing and catch the material as it flows out of the 3/4" coupling. Replace the 3/4" pipe plug and pour the dry charge in through the 1" pipe coupling at top of chamber.

The damp material should be placed in an open pan and dried at a temperature of between 150°C and 200°C for about 2 hours. When dry, the material is blue in color. The initial change in color should not be considered as complete reactivation since the particles dry from the outside toward the center and the outer surfaces change color first. During reactivation the temperature of the material is nearly constant at a value less than the temperature of the oven. As the reactivation approaches completion the temperature of the material rises rapidly toward the final temperature.

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